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ABSTRACT

This paper presents a model which illustrates the cyclical and interactive nature of the basic elements of the research design process. Rather than presenting each research design component in isolation, the model emphasizes their interrelationships. A brief discussion is presented on each of the following components of the model: (1) the "words" of research design--concepts, constructs, variables, and operational definitions; (2) observations and data collection--issues related to subject selection and measurement; (3) instrumentation--issues related to reliability and validity assessment, and (4) data analysis--issues related to scales of measurement. The summary discusses the integrative and holistic nature of the research process. (JD)

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AN INTEGRATIVE MODEL FOR TEACHING RESEARCH DESIGN

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Symposium on New Approaches to Teaching Research and Statistics

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AN INTEGRATIVE MODEL FOR TEACHING RESEARCH DESIGN

The purpose of this paper is to present a model which illustrates the cyclical and interactive nature of the basic elements of the research design process. Instruction models have tended to present each of these research-design components *in isolation*, thereby not allowing students to see clearly their *interrelationship*. This model is graphically depicted in Figure 1, on Page 5.

Each major component of this model will be briefly discussed under its associated sub-headings below. A brief explanation will be provided of the meaning and importance of each step. In addition, a number of these steps have traditionally caused misunderstanding and/or difficulty for students attempting to apply them to an actual research design. These areas warrant specially targeted teaching and will be mentioned within each related section.

The "Words" of Research Design: Concepts, Constructs, Variables and Operational Definitions

The first portion of this model involves the translation and refinement of areas of interest, from "common-sense, man-in-the-street" meanings (*concepts*), to more of the rigorous, scientific terminology (*operational definitions* of the *constructs* and *variables* which are included in the *statement of the problem*). Careful formulation of the problem statement, as well as successive refinement of the variables to be studied, has traditionally been a critical yet often troublesome process for students of graduate research design and dissertation seminar. In their concern with the other aspects of the process (particularly data analysis and its associated "anticipatory anxiety"), students have often given short shrift to this initial step. The inevitable result has been problem statements which are poorly thought out, vague, and/or mismatched with the subsequently selected data-analysis procedure(s). By its careful placement in the forefront of the model, the problem statement is given its proper emphasis as the foundation of all of the subsequent research steps.

Observations and Data Collection: Issues Related to Subject Selection and Measurement

The next major portion of the research cycle deals with *making observations* and *collecting data*, based upon the foregoing operational definitions. Central to this process is a carefully delineated *population* and associated selection of the *sampling scheme(s)* to be employed in subject selection. Especially with regard to the latter, students have failed in many cases to appreciate the great diversity of options which exist. For one thing, some students naively assume that "simple random sampling" is the only, and/or best, form of probabilistic sampling procedures. They also tend to shy away from use of any sort of non-probabilistically based sampling schemes, believing them to be absolutely and automatically inferior. Finally, they frequently do not realize that *multi-stage sampling schemes* are not only perfectly feasible, but often optimal, for addressing a given research question.

Instrumentation: Issues Related to Reliability and Validity Assessment

Data collection generally involves selection and use of some sort of *instrumentation.* The necessity of establishing *reliability* and *validity* of such instrumentation is given its proper (and often-overlooked) emphasis in this model. As students learn the meanings and methods of demonstrating reliability and validity, they also come to realize that self-developed instrumentation is often desirable, and in fact superior, to selection of an existing standardized test, given that the former can be shown to possess these two properties of "good" measurement.

Data Analysis: Issues Related to Scales of Measurement

There are two major aspects of data collection which are sometimes poorly understood by students, and they are therefore prominently featured in this portion of the research model. The first of these has to do with the fact that there are two alternative

forms of data; *quantitative* and *qualitative*. More importantly, the former is not necessarily "superior" to the latter. That is, students can be deceived by the sometimes "illusory precision" of numbers, while neglecting the breadth and scope of information conveyed by qualitative data (e.g., such as that resulting from structured interviews and observations). These students are often surprised, and delighted, to learn that rigorous and academically accepted procedures do, in fact, exist for the collection, summarization and reporting of qualitative information.

The second area emphasized in this portion of the research-design model concerns proper identification of the *scale(s) of measurement* of the quantifiable variable(s) being analyzed. Interpretable results critically depend upon the correct identification and matching of the scale(s) of measurement to the corresponding choice of inferential statistical procedures being employed to analyze the data. Students sometimes choose the "wrong" statistical method (e.g., a two-group t-test for rank-order data), as a result of their failure to consider the scale of measure. On the other hand, they respond positively to an intensive review of scales of measure, even indicating that they can better understand the "true meaning" of some of the more common statistical procedures which up until now had been little more than "cookbook formulas."

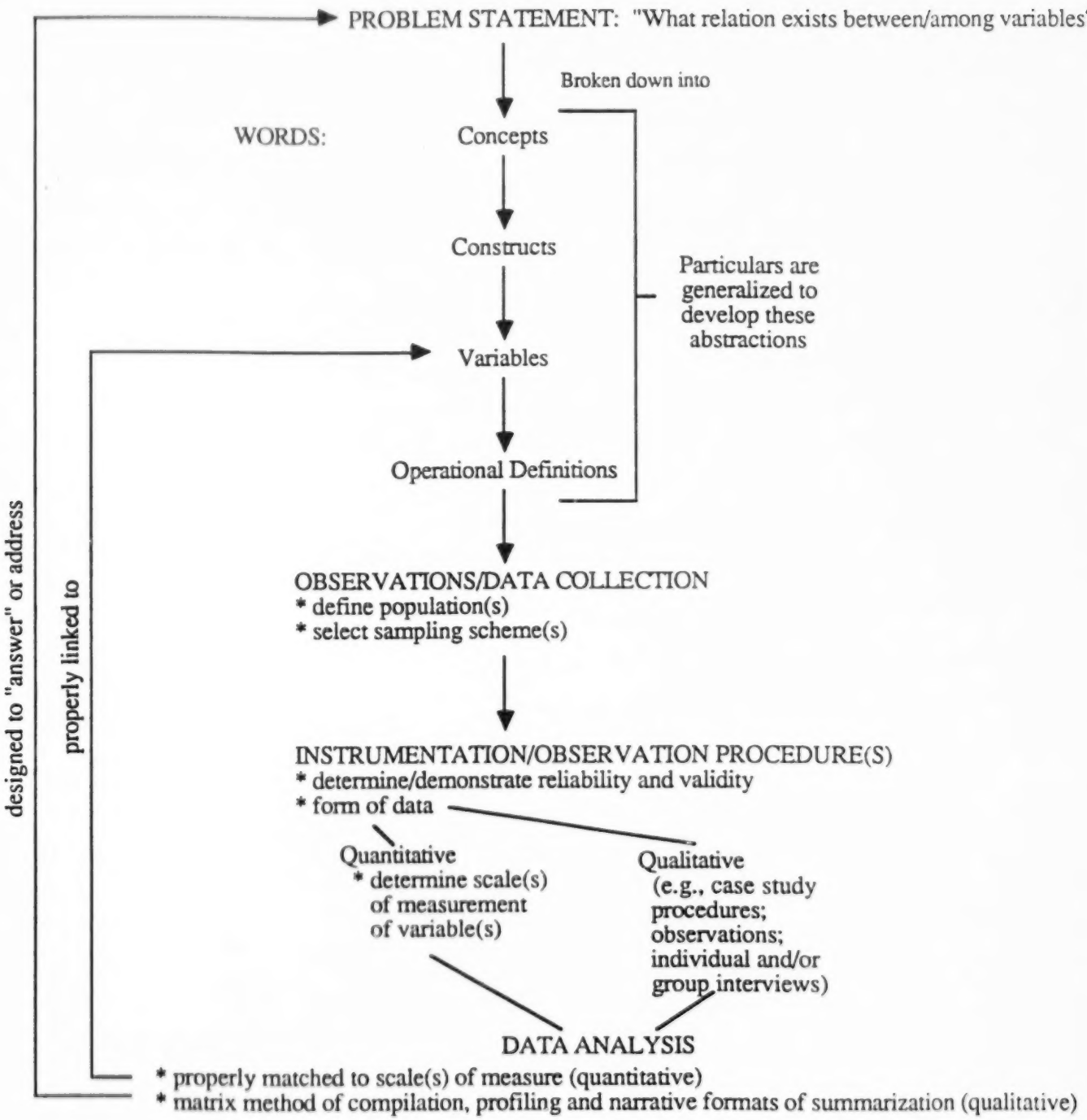
Summary: The Integrative and Holistic Nature of the Research Process

Finally, the *cyclical* nature of the model is re-emphasized by the arrow leading from data analysis back to the original variables being measured, and therefore to the research question(s) which the study is designed to address. The model itself may be thought of as a "focused cone," with a gradual partitioning or refinement of the key steps of the research process, along with their interrelationship and linkage back to the overall objectives of the study.

By carefully introducing this comprehensive model early in the research-design and dissertation-seminar classes, the authors have provided students with an overall framework

or scope of the "big picture" of the research process. This helps insure that students will not become unduly fixated upon an isolated step, thereby neglecting its association with other steps and with the overall purpose of the study. The authors have realized an appreciable increase in the quality of students' proposal submissions as a result of emphasizing this holistic approach in their teaching and advisement of graduate-level research-oriented students.

Figure 1.
An Integrative Model for
Teaching Research Design


PROBLEM STATEMENT: "What relation exists between/among variables?"
Broken down into
WORDS:
Concepts
Constructs
Particulars are generalized to develop these abstractions
Variables
Operational Definitions
OBSERVATIONS/DATA COLLECTION
* define population(s)
* select sampling scheme(s)
INSTRUMENTATION/OBSERVATION PROCEDURE(S)
* determine/demonstrate reliability and validity
* form of data
Quantitative
* determine scale(s) of measurement of variable(s)
Qualitative
(e.g., case study procedures; observations; individual and/or group interviews)
DATA ANALYSIS
* properly matched to scale(s) of measure (quantitative)
* matrix method of compilation, profiling and narrative formats of summarization (qualitative)
properly linked to
designed to "answer" or address